T. Don Tilley

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Biographical Sketch:
T. Don Tilley was born in Norman, Oklahoma, on November 22, 1954. After receiving his B.S. degree in chemistry from the University of Texas in 1977, he went to the University of California at Berkeley where he completed graduate studies in organolanthanide chemistry under the direction of Richard Andersen (Ph.D. 1982). After his graduate work at Berkeley he was appointed as an NSF-sponsored exchange postdoctoral fellow to work jointly with Bob Grubbs and John Bercaw at the California Institute of Technology (1981-2), and with Luigi Venanzi and Piero Pino at the ETH in Zürich (1982-3). During this period, he developed the chemistry of the (pentamethylcyclopentadienyl)ruthenium fragment. In 1983 he began his independent research career as an Assistant Professor at the University of California at San Diego. There he was promoted to Associate Professor in 1988, and then to Professor in 1990. In 1994, he accepted appointments as Professor of Chemistry at the University of California at Berkeley and as Faculty Senior Scientist at the Lawrence Berkeley National Laboratory.

While at UC San Diego, Tilley received an Alfred P. Sloan Fellowship (1988), a Union Carbide Innovation Recognition Award (1991-92), and a Japan Society for the Promotion of Science Fellowship (1993). At UC Berkeley, Tilley received an Alexander von Humboldt Award for Senior Scientists (1998) and was elected to the American Association for the Advancement of Science (1998). . He was the 2002 recipient of the ACS award in Organometallic Chemistry, and was elected Chair of the Division of Inorganic Chemistry of the ACS for 2003. Tilley has been a Visiting Professor at the ETH in Zürich (1998) and at the University of Montpellier in France (2000), and has been awarded named lectureships at the Universities of Oklahoma (1991), Ottawa (2000), Texas (2001), British Columbia (2002), Arkansas (2003), and Missouri, St. Louis (2003), and at the Rensselaer Polytechnic Institute (2002).

Tilley's initial research program at UC San Diego focused on organometallic chemistry, and in particular the chemistry of transition metal-silicon systems. Systematic investigations on early transition metal-silicon bonded compounds demonstrated that d0 metal-silicon bonds are highly and uniquely reactive. Perhaps the most significant aspect of this work characterized "sigma-bond metathesis" reactions as forming the basis for a new polymerization mechanism, by which early metal complexes catalyze the dehydropolymerization of hydrosilanes to polysilanes. This chemistry was extended to the polymerization of secondary stannanes, to produce the first high molecular weight polystannanes. Recently, this

chemistry has been used to develop the first homogeneous catalysts for methane conversion, based on sigma-bond metathesis. Other investigations have focused on the synthesis and study of transition metal complexes with silylene and other reactive silicon "intermediates" as ligands. In the early to mid-1990's, Tilleys research broadened to include studies on electronically active polymers, organic supramolecular chemistry, and materials chemistry. The polymer chemistry in Tilley's group focuses on the use of new metal-mediated synthetic routes to conducting and luminescent polymers. Supramolecular chemistry derives from the discovery that zirconocene-coupling methods provide convenient and high-yield routes to macrocycles and cages of various shapes, sizes, and functionalizations. Applications of this chemistry target the development of receptors for anions, ligand systems for metal-based catalysts, and building blocks for 3-dimensional electroactive, nanoporous networks. As a Faculty Senior Scientist at LBNL, Tilley has developed a program based on the molecular design and synthesis of advanced materials. Primary targets are oxide-based materials produced from tailored, oxygen-rich precursor molecules. This new process for generating solid state materials has been used in the synthesis of mesoporous materials with well-defined and complex compositions. In addition, Prof. Tilley's group has developed molecular precursor routes to heterogeneous catalysts for selective chemical transformations. This strategy has been used, for example, to produce catalysts with good activities and selectivities for the oxydehydrogenation of propane. Molecular precursor methods have also been employed for the creation of well-defined, catalytic single sites on the surface of oxide supports.

Relevant Publications:
T. Don Tilley's Publications